

Customer No.: 31561
Application No.: 10/604,794
Docket No.: 9725-US-PA

REMARKS

Present Status of Application

Claims 1-25 remain pending in the application. Claims 1-25 were rejected under 35 USC§103(a) as being unpatentable over Applicant's Prior Art (APA) in view of Chow et al. (US Patent Application Publication 2002/0185733 A1). Claims 1-25 were rejected under 35 USC§103(a) as being unpatentable over Chow et al. (US Patent Application Publication 2002/0185733 A1).

After considering the following remarks, a notice of allowance is respectfully solicited.

Discussion for 35 USC§103 rejections

Claims 1-25 were rejected under 35 USC§103(a) as being unpatentable over Applicant's Prior Art (APA) in view of Chow et al. (US Patent Application Publication 2002/0185733 A1). Claims 1-25 were rejected under 35 USC§103(a) as being unpatentable over Chow et al. (US Patent Application Publication 2002/0185733 A1).

As recognized by the Office Action, APA fails to show that the wettable layer is fabricated using copper and has a thickness between about 3 to about 8 microns. The Office Action relied on Chow for teaching the wettable layer fabricated using copper and having a thickness between 3-8 microns for the purpose of preventing in-diffusion of the solder into the semiconductor chip.

Customer No.: 31561
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Applicant respectfully traverses these rejections.

Chow merely discloses forming a barrier cap layer 14 encapsulating the underlying copper under-metallurgy-metal (UBM) 12. However, as emphasized by Chow, the nickel cap layer 14 forms a barrier between the UBM 12 and the solder bump 16, and the nickel cap layer 14 significantly limits (avoids) the formation of tin-copper inter-metallics (paragraphs [0050] and [0053]). Regarding the teachings of Chow as a whole, Chow teaches forming nickel cap layer 14 for preventing in-diffusion of tin in the solder bump into the UBM. Therefore, one skilled in the art will consider to form a nickel cap layer, rather than a wettable layer of copper with a thickness of 3-8 microns, for preventing in-diffusion of tin in the solder bump into the UBM, as suggested by Chow. So far, nowhere in Chow's teachings provides the motivation for the modification proposed by the Office Action. Since no motivation is provided, one skilled in the art will not consider it obvious to use Chow to modify the APA's wettable layer.

In determining whether even a prima facie showing of obviousness exists, it is necessary to ascertain whether the prior art teachings suggest the claimed combination to one of ordinary skill in the art. The burden of establishing a prima facie showing of obviousness rests upon the Patent Office, and that burden has not been met.

Even if considering Chow's layer 8 comprising one or more of Cr, Cr/Cu

Customer No.: 31561
Application No.: 10/604,794
Docket No.: 9725-US-PA

alloy, Ti, Ti/W, Ni/V, Cu, Ni and Au, nothing at all in Chow's disclosure teaches or suggests the upper part of 8 being fabricated using a nickel-vanadium alloy. Obviously, there is no clear teachings in Chow's disclosure and no motivation is provided by the Office Action. It is urged that the claims should not been used as a guide to choose desirable features from the reference to achieve the claimed invention.

As a result, Applicant submits that independent claims 1, 8 and 20 patently define over the cited reference, either alone or in combination. Regarding the rejection under 35 USC 103(a), the Applicants submit that dependent claims be patentably distinguishable over the cited references for at least the same reasons as the independent claims, from which these claims respectively depend, as well as for the additional features that these claims recite.

In view of the above amendment and discussions, reconsideration and withdrawal of the 103 rejections are respectfully requested.

Customer No.: 31561
Application No.: 10/604,794
Docket No.: 9725-US-PA

CONCLUSION

In view of the foregoing, it is believed that all pending claims are in proper condition for allowance. If the Examiner believes that a telephone conference would expedite the examination of the above-identified patent application, the Examiner is invited to call the undersigned.

Respectfully submitted,

Date :

Sept 27, 2004

Belinda Lee
Belinda Lee

Registration No.: 46,863

Jianq Chyun Intellectual Property Office
7th Floor-1, No. 100
Roosevelt Road, Section 2
Taipei, 100
Taiwan
Tel: 011-886-2-2369-2800
Fax: 011-886-2-2369-7233
Email: belinda@jcipgroup.com.tw
Usa@jcipgroup.com.tw

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